KPMG

The future of IT: Next generation IT operating models

Part two: integrate

November 2017

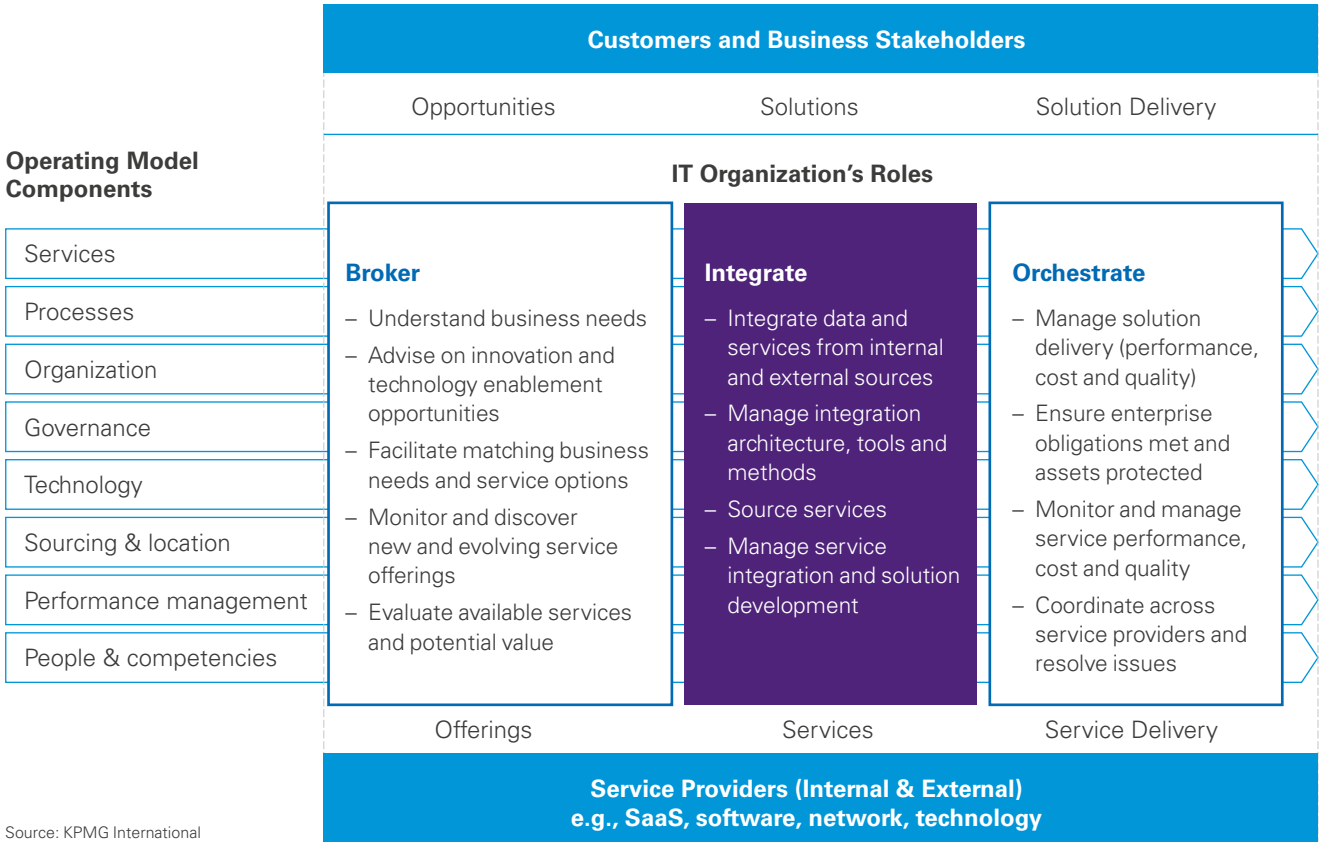
Introduction

Today, most organizations are somewhere along a digital transformation journey employing disruptive technologies to innovate across products, services, and business models[1]. CIOs have been struggling to keep up with the insatiable demand for new digital capabilities from their business stakeholders. In fact, many have been watching their business counterparts increasingly turn to external providers for the technology enablement they need. In response, some CIOs have adopted multi-speed IT, increased their use of agile methodologies, or even created standalone digital units separate from the traditional IT organization. But these are only stop-gap measures. What's really needed is adoption of an entirely new IT operating model.

KPMG first introduced its next generation IT operating model in late 2014 encompassing three new roles for IT: broker, integrate, and orchestrate (see Figure 1)[2]. This is not just a new name for the traditional plan, build, run legacy IT operating model. Where plan, build, run also described a functional organization structure comprised of technical silos, the broker, integrate, orchestrate (BIO) model describes roles that are independent of any organizational structure. In fact, we believe that the IT BIO model can support a variety of functional / organizational structures based, for example, on a line of business, product/platform, or channel alignment. One thing is clear – whatever new organization structure is implemented, it will break down the traditional technology silos while requiring new skills.

In this, the second in a series of three reports, we will take a closer look at the role of 'Integrate' in the new operating model and the implications for CIOs.

Figure 1: The broker, integrate, orchestrate (BIO) IT operating model



Source: KPMG International

1. "By 2020, 50% of the G2000 will see the majority of their business depend on their ability to create digitally-enhanced products, services, and experiences." IDC Worldwide IT Industry Futurescape, Nov 2016
2. See "Next Generation IT Operating Models", KPMG Institutes, August 2016, http://www.kpmg-institutes.com/content/dam/kpmg/advisory-institute/pdf/2015/next-generation-it-operating-models.pdf

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The integrate role optimizes value

KPMG professionals' experience shows that digital transformation requires substantial technology enablement to bring it to fruition. Short-term gains can be achieved with point solutions like mobile apps or social media engagement, but sustainable competitive advantage and business value comes when organizations go beyond restructuring operations in customer-facing functions and fully integrate across the front, middle, and back offices to create a truly digital enterprise. As IT brokers digital capabilities and solutions from multiple sources, migrates to continuous delivery practices, and facilitates linkages to evolving ecosystems, integration with existing systems and data will become the key to unlocking business value.

For many established organizations, disruptive innovation has been focused on customer-facing solutions. However, optimizing value from these investments typically involves integration with middle and back office systems of record to provide a seamless customer experience as well as a holistic view of customer data. Additional important issues in an integration include preserving architectural integrity, identity and access management, security, legal and regulatory compliance, and disaster recovery and business continuity.

The need for open architectures

Most IT architectures in place today were designed for stability and to limit choices with a focus on conformance to standards to achieve a homogeneous and reliable environment. Core applications tended to be large, monolithic systems with layers of dependencies and long release schedules. Any integrations were mostly custom, point-to-point interfaces that were time-consuming to develop and test, increased the overall complexity of the system, and increased their fragility. Service Oriented Architecture (SOA), originally conceived to solve this problem, was conceptually sound but in practice lost sight of its original goals and evolved to become just as complex and costly to implement[3]. Over the years things have only got worse as existing applications have been enhanced and new applications have been added to the portfolio.

In the digital era, where speed and agility are key drivers and participating in ecosystems is an increasing source of competitive differentiation and value, existing architectures and application portfolios have become barriers to innovation. The pace, volume, and scope of change driven by digital businesses requires open, adaptable, and modular architectures that are optimized around speed, scalability, and reliability to facilitate innovation.

The IT 'Integrate' role addresses three significant integration needs. The first of these is to modernize existing core applications to reduce integration barriers and complexity, while the second is to implement a new, open architecture that facilitates new development and integration of capabilities that use agile methods and continuous delivery practices. The third, meanwhile, is to organize a center of excellence to educate and advise development teams across the enterprise on integration methods, tools, and best practices.

3. For a more detailed explanation of what went wrong with SOA, read "Learn from SOA: 5 Lessons for the Microservices Era", Matt McLarty, InfoWorld, June 9, 2016. http://www.infoworld.com/article/3080611/application-development/learning-from-soa-5-lessons-for-the-microservices-era.html

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The integrate role optimizes value cont...

01 Modernize applications

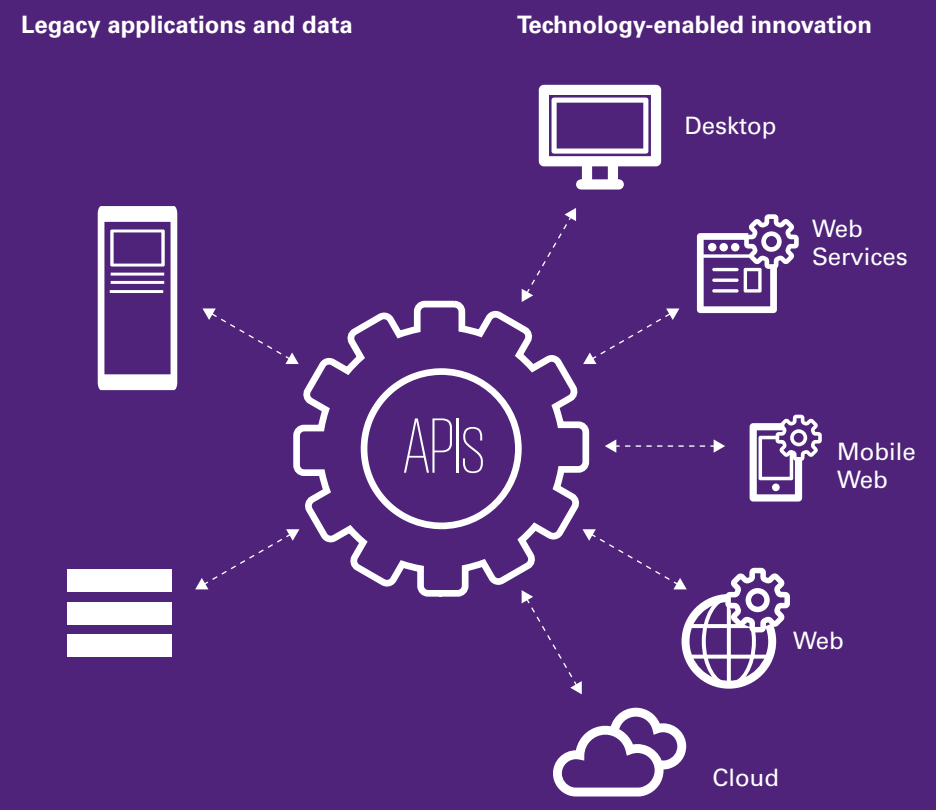
Legacy systems are predominantly an organization's core applications and data comprising its systems of record including financial, customer, and employee information. They were designed for stability, reliability, and auditability. Over the years they have been upgraded, enhanced, and integrated which has only increased complexity, created dependencies, and consumed an ever-growing chunk of the IT budget.

When it comes to digital, most of the innovation is happening at the edge and with customer, employee, or partner-facing systems of engagement and systems of insight. Often this innovation means tapping into an evolving ecosystem. While creating value on their own, even greater value and competitive differentiation can be had when these new innovations are integrated with the core systems of record.

But that is a big problem for many. The complexity and dependencies of the legacy systems and data make this difficult, time-consuming, and risky. They simply can't support the pace of change required by the business. One approach is to completely re-write or replace these systems but this is a multi-year project that could easily cost over US$100 million for large organizations.

However, new architectural approaches enabled by recently developed tooling offer lower cost and faster alternatives to 'rip and replace'. Application programming interfaces (APIs) have quickly become a preferred method for creating an abstraction layer between legacy applications and data, and enabling newer innovative digital business solutions – see Figure 2. By using APIs, new functions and capabilities can be more easily integrated with existing legacy applications. At the same time, functionality in legacy applications can be incrementally replaced or enhanced by using 'strangler apps' – see Sidebar on page 5.

Figure 2: Legacy modernization and integration with APIs



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02 Architect for integration

Satisfying the organization's need for digital capabilities that can be delivered quickly, changed frequently, and easily integrated with internal and external systems running in the cloud, requires a new approach to architecture and solutions development.

A new architecture for digital business must support secure, standards-based integration, favor a cloud-first implementation, accommodate agile methods, and recognize the growing role of ecosystems in the value stream.

An integration architecture is enabled by APIs which Forrester calls "business building blocks that open digital connections to any business asset or capability.[4]" APIs package business assets and data, making them accessible internally and externally and unlocking new sources of value. They describe four types of APIs that are the critical tools to accelerate business technology and digital strategy alignment. These four API types include:

— **Internal APIs.** Used to integrate systems by abstracting systems of record from rapidly changing customer or partner-facing touchpoints. For example, linking all sales channels, i.e. mobile app, telephone, web, and in-store to the same backend order processing and payment systems.

— **B2B APIs.** Used to enable collaboration and relationships with business partners. They allow organizations to expose previously internal services to partners and consume data and services to enhance their own products.

— **Open web APIs.** Where B2B APIs are used by select partners, open web APIs are available to anyone, e.g. major enterprises, individuals, developers, etc. and are often the source of innovation.

— **Product APIs.** Used to increase product value by connecting to and expanding the ecosystem. They are of interest only to those buyers and users of a product and ecosystem players that add value by building incremental capabilities.

Increasingly, solutions will start as minimum viable products (MVP) that provide the smallest amount of function that still delivers value. Over time, frequent enhancements released on a regular cadence add additional capabilities and value. These solutions will be delivered as services which may in turn be composed of several loosely coupled re-usable microservices running in the cloud.

The microservice architectural style is an approach to developing a single application as a composable set of small services, each running in its own process and communicating with lightweight mechanisms, often an HTTP resource API. These services are built around business capabilities and are independently deployable by fully automated deployment machinery. There is a bare minimum of centralized management of these services, which may be written in different programming languages, use different data storage technologies, and be sourced internally or externally[5].

Strangler applications

A strangler application is a pattern for gradually creating a new system around the edges of an old one, letting it grow slowly over several years until the old system is strangled. A strangler application is usually composed of small pieces of functionality that are released frequently. This provides a steady stream of value while significantly reducing the risk involved in a complete re-write.

4. For and in-depth look at how APIs are enabling innovation at a number of businesses, see the June 1, 2015 Forrester Research report "How APIs Reframe Business Strategy" by Randy Heffner. https://www.forrester.com/report/How+APIs+Reframe+Business+Strategy/-/E-RES119426

5. This definition of microservices is derived from a blog post by Martin Fowler that appeared on martinfowler.com at www.martinfowler.com/articles/microservices.html

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03 Organize an Integration Center of Excellence (ICoE)

Technology enablement to support digital business requires a new IT operating model and technology architecture, as well as development, test, and deployment methods. It requires new skill sets that are currently in short supply and will most likely remain that way for the foreseeable future. Furthermore, the pace of change requires a decentralized approach with much of the work being done within the lines of business and close to the customer. Establishing an integration center of excellence (ICoE) can initially provide some economies of scale with scarce resources while additional talent is acquired and/or developed. The primary responsibilities of the ICoE are to:

— **Establish integration standards and best practices.** The ICoE will develop a standardized approach to integration, evaluate and select required tooling, and collect, document, and communicate best practices from across the enterprise

— **Manage API governance and the API repository.** Develop an initial set of integration APIs, create and manage a framework for API governance and populate and maintain a repository of standard integration APIs

— **Conduct integration training.** Develop a curriculum to train business analysts, developers, and ecosystem partners in integration practices

— **Provide integration support to enterprise applications and data.** Serve as the primary interface to developers for integrating new products and services with existing enterprise-wide applications and databases

— **Consult and advise business unit development teams.** Work with business unit development teams to provide integration expertise on projects throughout their lifecycle.

Over time, as organizations develop and recruit talent with the appropriate skills and gain experience with integration practices and tools, some of the ICoE's responsibilities may be scaled back, eliminated, or migrated into the business units and product teams. However, there will always be a need for centralized control of API governance and architecture principles.

Figure 3: Integration Center of Excellence (ICoE)

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Integrate role: key players

Perhaps the biggest challenge confronting CIOs as they transform the IT operating model is the human capital component. The broker, integrate, orchestrate roles have profound implications for existing positions and skills – see Figure 4. New positions and skills are required, some current IT positions need to evolve, and others need to be scaled back or even eliminated. Key players in the integrate role include:

Business Analysts

An important part of modernizing core systems is to gain an understanding of exactly what they do, who they support, what inputs they require, what outcomes they produce, what dependencies they may have, and what value they deliver. Business analysts are required to discover the answers to these questions, determine if an application is still required, look for any duplicates, and work closely with business users to decide if the value delivered exceeds operational costs. Answers to these questions will inform decisions about what course to take.

Business analysts will develop options for modernization that may include retiring (application is no longer required), re-writing (application is still required and needs enhancing), replacing (application function is still required but replacement is more cost effective), or abstracting (using APIs to provide an integration layer) to enable integration.

Figure 4: Integrate role key players and outcomes

Objectives	Key players	Desired outcomes
Modernize core systems	Business Analysts Developers	– Remove core systems as barriers to innovation – API repository and governance
Create and maintain an open, flexible architecture	Integration Architects	– An open and adaptable technology architecture that facilitates innovation and integration
Provide a center of excellence for integration	Integration Specialist Data Engineers	– Promote use of standardized methodologies and tools – Promote re-use of components – Assist product teams with integration issues

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Key integrate players cont...

Developers

Developers in the integrate role will be involved in a number of activities that include making changes to existing core systems as part of a modernization program. They will also create many of the APIs required to abstract their functionality to support incremental replacement and enhancements. Developers will require skills in agile methods, APIs, integration architectures, and microservices.

Integration Architects

The customer is a driving force behind digital transformation, and improving customer experience and engagement are increasingly areas of competitive differentiation. Customers want to engage across the entire enterprise over multiple channels, both physical and digital, and they expect a seamless experience. Integration architects are required to develop the overall integration architecture with respect to legacy infrastructure, applications, data, security, and disaster recovery with a specific emphasis on digital.

This architecture will need to be adaptable to accommodate the accelerating pace of change. Cloud is becoming the go-to first choice for infrastructure and solutions but large enterprises will require a hybrid approach - so the architecture must support an ability to easily migrate between different types of infrastructure.

Integration Specialists

A new role, integration specialists will initially reside within the ICoE but eventually migrate into business units. They will work closely with cross-organization development teams and ecosystem partners to assist in integrating new solutions with existing core systems and data. They will bring expertise with legacy applications and data, and with the integration APIs.

Data Engineers

Digital transformation is taking place in an increasingly data-driven world. Enormous amounts of data are being created every minute from social media posts to sensors embedded in products. Data is critical to creating value and organizations that can collect, aggregate, and analyze it are using it to better understand customers, improve decision-making, and gain competitive advantage. Much of this new data is unstructured and often resides in silos. Before data scientists can apply analytics and gain insights, data engineers are required to organize the data to make it easily accessible to users. This will include building tools, infrastructure, frameworks, and services. They will collaborate closely with data science teams in order to build the right solutions for them.

Intelligent Automation

Intelligent automation in the form of digital labor and artificial intelligence will also play a key role in the next gen IT operating model. It is already making some significant contributions on the operations side of IT. From initial deployments aimed at providing user self-service for tasks like password resets, it has evolved into more sophisticated uses like chatbots to handle level one support calls. Newer use cases range from automated provisioning of infrastructure (software defined data centers) to automated testing and deployment of applications solutions into production. As machine learning and other advanced cognitive capabilities evolve and mature, higher level tasks may be automated or semi-automated, augmenting or even replacing coders and business analysts. The only certainty is that traditional IT organizations will become smaller from a combination of migrating infrastructure to the cloud, automating most manual processes, and transferring other roles into business and functional units.

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Next steps

Changing the IT operating model is an enormous challenge with very high stakes. It is further complicated because IT must continue to support existing portfolios including retained infrastructure and legacy applications during the transformation. For some time, IT will be operating with a hybrid model as infrastructure and operations migrate to the cloud, legacy applications and services are retired, modernized or replaced, existing skill sets are upgraded or acquired, and stakeholders adjust to the new approach.

For many, the biggest single challenge concerns the human capital element. IT organizations will get smaller even as demand increases due to the convergence of several secular trends. These include the virtualization and/or migration of infrastructure to the cloud which will shrink or even eliminate data center footprints and associated operations staff; the increasing automation of many processes and functions through digital labor; the evolution of applications development away from large waterfall project-based work to smaller, cross-functional agile teams; and the ongoing assumption of former IT functions by the business. In addition to shrinking, many of the remaining roles will require new or evolving skills.

As a first step, begin by assessing your current staffing and skills against the requirements of the Integrate role and conduct a gap analysis. Key questions to ask are:

— How can your existing IT staff be developed to take on new roles and what skills/training will they need?

— How can IT create opportunities to recruit internal candidates from the business?

— How will your talent management capabilities have to change to ensure that you have access to the needed skills both internally and externally?

— How can you satisfy the most immediate needs while you build your capabilities?

This will identify candidates for training as well as what new skills need to be sourced.

The second step is to assess your core systems and integration capabilities. Do you have in place the expertise, resources and committed funding to evaluate and modernize core systems with an emphasis on integration with innovative new capabilities? Key questions to ask are:

— How will emerging technologies integrate with existing infrastructure and applications?

— How will you acquire the expertise in agile methods, API development, and integration architecture?

— How can you develop strategic relationships with your vendors, partners and independent developers?

In part 3 of our series we will explore the 'orchestrate' role.

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